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AUTHOR Reeve, Robert A.; And Others
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ABSTRACT

This study examines 4-year-olds' ability to search and find a missing object, a complex problem-solving task dependent on remembering events, logically deducing the possible subset of hiding places, and implementing situation-dependent search strategies. Sixty-four children recruited from two day care centers in a small midwestern city searched for a lost object on two occasions. On the first occasion, half of the children searched a three dimensional table-top model for a missing item after watching a sequence in which a puppet lost the item. The other children searched under naturalistic conditions, looking in a familiar environment for an object that had been lost while they put away some toys. Half the children were questioned about their search behaviors, after which all children participated in the second search task--a table-top search. In the first task, more searches took place in locations bounded by the last place the object was seen and the first place in which it was discovered missing if children searched in the naturalistic rather than the table top condition. In the second task, children searched the "critical area" more often if they were queried about their search behavior in the first task or if they searched intially in the naturalistic task. The results are discussed in terms of factors affecting the development of problem-solving competence. Three pages of references and tables of data are included. (DR)

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Technical Report No. 373

REMEMBERING THE RIGHT LOCATIONS: FACTORS AFFECTING YOUNG CHILDREN'S LOGICAL SEARCH ABILITY

Robert A. Reeve, Joseph C. Campione, and Ann L. Brown

University of Illinois at Urbana-Champaign

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University of Illinois
at Urbana-Champaign
51 Gerty Drive
Champaign, Illinois 61820

Bolt Beranek and Newman Inc.
10 Moulton Street
Cambridge, Massachusetts 02238

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Abstract

Four-year-olds searched for a lost object on two occasions. On the first occasion, half the children searched a three dimensional table-top model for a missing item after watching a sequence of events in which a doll lost the item; the rest of the children searched under naturalistic conditions, looking for an object that had been lost while they tidied away some toys. Half the children were then questioned about their search behaviors, following which all children participated in the second search task--a table-top search task. For the first task, more searches were in the "critical area" (those locations bounded by the last place the item was seen and the first place it was found to be missing) if children searched in the naturalistic rather than the table-top condition. In the second task, children searched in the "critical area" more often if they were queried about their search behavior in the first task, or if they had searched initially in the naturalistic task. The results are discussed in terms of factors affecting the development of problem solving competence.

Remembering the Right Locations: Factors Affecting Young Children's Logical Search Ability

Searching efficiently for a missing object is a complex problem solving endeavor, dependent upon coordinating the memory of events, the logical deduction of the possible sub-set of hiding places, and the implementation of situation-dependent search strategies. If an adult misplaces an object but is uncertain of its exact whereabouts, his or her search will typically be confined to a critical area bounded by the point at which the object was last seen and the point at which it was first discovered to be missing. Restricting search to the critical area is an important skill because it reflects the ability to infer logically those locations that define the necessary and sufficent search area. Young children's ability to use such inference skills and restrict their search to the critical area appears to be affected by the nature of the search problem however.

In so-called naturalistic contexts where children visit a series of locations in a familiar environment and lose an object en route (e.g., a camera) preschoolers exhibit good logical search ability and frequently look for the lost object in the critical area (Anooshion, Hartman, & Scharf, 1982; Haake, Somerville, & Wellman, 1980; Wellman, Somerville, & Haake, 1979). In contrast, when the search problem is described with the aid of a three

dimensional table-top model, and the task is to identify where a puppet lost a once possessed object for example, 7-year-olds show poor logical search skills, frequently looking for the lost object outside of the critical area, and often in locations not visited (Drozdal & Flavell, 1975).

There are, of course, many differences between the table-top and the naturalistic search environments that may account for the use of search skills in the two tasks. However, in the present research we are more interested in the fact that skill differences occur in tasks that have a similar underlying structure, than in the specific reasons for these differences. Specifically, we are interested in when 4-year-olds would use in a table-top search task those search skills they putatively use to guide search activity in naturalistic environments.

One way of characterizing the skills used to locate missing objects is in terms of the distinction between logical and pragmatic inference skills (Haake et al., 1980; Paris, 1978). In using logical inferences, identifying the critical area as the necessary and sufficient area to search is not dependent on the search context but can be inferred logically from given information. In contrast, pragmatic inferences tend to be driven by real-world knowledge of likely hiding places and knowledge of object displacement (others move objects). Thus, drawing pragmatic inferences do not necessarily depend upon coordinating

given information whereas logical inferences do require such a synthesis.

The decision to use either pragmatic or logical inferences may depend on the problem, or on a predisposition to search comprehensively or selectively (Wellman & Somerville, 1982). If an economically efficient search is not required, comprehensive searching may occur. However, if search constraints are operating (e.g., only 3 locations may be searched), it is important to synthesize search-relevant information and select locations which have the highest probability of yielding the missing object. Restricting search to the critical area when search constraints are operating, then, is a useful index of the ability to coordinate search-relevant information; however, little is known about the development of this particular skill.

Generally, young children show a propensity to be strategic in situations where the task context is maximally supportive of cognitive activity (Brown & Reeve, in press). Naturalistic search tasks presumably provide such support and allow the use of efficient search strategies; however, possessing logical search competence does not mean it will be used in all situations (e.g., in a table-top search task). Nascent cognitive skills are considered fragile, and may be "welded" to specific task contexts (Rozin, 1976). If this is true, it may be difficult to induce young children to use these fragile skills in new or difficult situations. It is also possible that young children do not use

skills that are in their repertoire because they do not recognize contexts that require them, or, if they recognize the context, are unable to access the relevant cognitive skills (Brown & Campione, 1984; Flavell, 1981). Understanding when and how young children are able to access existing skills to solve new problems is an issue that lies at the heart of developmental theory.

Two findings suggest conditions under which preschool children may extend their use of logical search skills. Crisafi and Brown (in press) found that 4-year-olds, but not 2- or 3-year-olds were able to solve a "difficult" inferential reasoning problem if they had first solved an easier version of the same problem. This result is consistent with the view that learners can be induced to solve increasingly difficult problems by leading them gradually through an easy-to-difficult problem sequence (Zeaman & House, 1963). Several other studies have shown that focussing young children on appropriate problem solving strategies by asking them task-relevant questions may facilitate problem solving success (Brown, Kane, & Echols, in press; Reeve, 1985a). Answering task-appropriate questions presumably helps children access appropriate problem solving routines that may be a precondition for their use in solving relevant problems (Brown, Bransford, Ferrara, & Campione, 1983; Ericsson & Simon, 1980).

Both easy-to-hard problem sequencing and asking task-appropriate questions, then, appear to be mechanisms that can

facilitate access to problem solving routines that, in turn, may increase the probability of the accessed routine being used to solve a new problem. On the basis of these views, it would be expected that logical search behavior on a table-top task would improve if a child searched initially in a naturalistic situation or were asked questions about effective search behaviors used in a prior search task. Specifically, the present experiment was designed to examine whether preschool children's ability to conduct a logical search on a table-top problem, similar to the one used by Drozdal and Flavell (1975), would improve as a result of (a) practice on a different table-top task, (b) practice on a naturalistic problem, or (c) of being asked questions about search behaviors on a previous task.

Experiment

Method

Subjects. Sixty-four children with a mean age of 54 months (range = 44 months to 62 months, SD 4.25 months), recruited from two predominantly middle-class day care centers in a small mid-western city, served as subjects. Three subjects (2 boys and 1 girl) were dropped from the study because they refused to search, leaving 15 children in each of three conditions, and 16 in the fourth. An approximately equal number of boys and girls participated in each of the conditions.

Design. The design was a 2 (First Task: Naturalistic, Table-top) x 2 (Probe Questions: Present, Absent) between subjects factorial.

Procedure and materials. Testing took place in a mobile laboratory. Children were tested individually, and were brought to the laboratory putatively to paint a picture. For the first of the two search problems, half the children searched under naturalistic conditions, while the other half searched in a table-top condition. The mobile laboratory itself served as the search area for the naturalistic task in which children were asked to help put away seven toys (e.g., pencils, drum, ball, etc.) that had been left on the art table. The three-dimensional model used in the table-top search condition consisted of a set of small boxes (5" x 5" x 5") which were placed on a table so that a 4-year-old could not see over the top of the boxes when seated. The table-top model was constructed so that it was similar to the one used by Drozdal and Flavell (1975).

In the naturalistic search condition the experimenter gathered the toys from the art table, put them into a large box, and gave children the toys one at a time so they could be deposited in their respective storage containers. The storage containers were of different sizes and colors so that they were easily discriminable from each other. Overall, there were 10 storage containers, 7 of which were used to store toys. The experimenter accompanied the child as each of seven toys were

stored in containers that were within reach but above a 4-year-old's eye level.

While the second toy was being stored, a sheet of stickers was "discovered" in that toy's container. The stickers were removed from the toy's container and the child was told that he or she would be given a sticker when all the toys had been stored; the stickers were then surreptitiously passed to a confederate. The stickers were discovered missing while toy six was being stored; however, both toys six and seven were stored before the child was asked to search for the missing stickers.

In the table-top task(s) children were told a story about a toy doll who had, and then lost one of its possessions. The story line for each of the stories used in the study is presented in Table 1. Pictures, corresponding to the event in the story, were affixed to each of seven boxes (rooms) as the action sequence of the story developed. The pictures measured 3" x 3" and illustrated explicitly the events described in the story script (e.g., in Story 1 "Event 3," the picture showed Bert showing his toy truck to Grover). Overall, 10 boxes were placed on the table but, like the naturalistic search task, only 7 locations were used.

Insert Table 1 about here

After completing the initial search task, all children attempted to find a missing object in a second task, which was always a table-top problem. For those children who received two table-top search problems the presentation order of the tasks were counterbalanced across subjects, and the event sequence described in the first and the second story started at opposite ends of the set of boxes.

In all search tasks the critical search area was defined by locations 2, 3, and 5. Location 1 was the first place visited, and locations 6 and 7 were visited after the object was discovered missing. Further, location 4 was always an impossible hiding place. In the naturalistic task, location 4 was a pencil box which was too small to conceal the missing stickers; in the table-top stories the toy doll did not enter the fourth room and, therefore, could not have lost anything in that room. Finally, three additional boxes ("rooms") or containers were never visited and served as memory distractors. For all search problems, the unused containers were placed slightly apart from the others--one at the beginning and the end of the sequence, and one above location 4 (the impossible hiding place). The locations visited were always next to each other; that is, containers or boxes were arranged sequentially rather than in a random pattern.

After completing the first, and prior to the second search task, half of the children who had experienced either the naturalistic or the table-top tasks were asked questions about

their search behaviors on the first task. The questions were designed to focus children on the reasons for searching, or not searching, in particular locations in the search space. For the first question, children were asked why they searched in one of the critical area locations. (All but two children searched in the critical area at least once.) In the second question, children were asked why they did not search in the impossible search location, or why they did if they searched there (see below). Finally, children were asked why they did not search in one of the locations not visited. On all questions, children were encouraged to answer in terms of what they would tell a friend about their search behavior.

For all search problems, prior to searching for the lost object, children were asked to recall the order in which all the locations were visited. The purpose of assessing children's memory was to determine whether poor search occurred because children had not remembered the subset of possible hiding places. In addition, children were told explicitly that they would only be allowed to search in three locations for the missing item. The purpose of limiting to three the number of possible searches was to induce children to search selectively because Wellman and Somerville (1982) have suggested that young children have a tendency to search comprehensively. Further, all children were asked to think carefully about where they should search before beginning each of their three searches.

Prior to a child searching, the experimenter said she thought the lost object was probably in one of the boxes/rooms, the purpose of which was to emphasize the boxes/rooms as likely hiding places because, as DeLoache and Brown (1984) have shown, preschoolers often give plausible reasons for an object's disappearance when it is not in an expected location (e.g., it must have fallen down the back of the shelf). To minimize this problem for the second task, the missing object was "retrieved" on the third search if the child's first two searches had been in the critical area and the third search looked like it would be also. Otherwise, the experimenter "found" the missing item in a critical area search location that had not been searched. As children could not see into the "rooms," they were instructed to search for the lost object by feeling with their hands. Finally, to be consistent with the procedures of the naturalistic task, in the table-top tasks children were also promised a sticker if they found the lost object.

Results

Preliminary inspection of the data showed that, irrespective of condition, children had little difficulty recalling accurately the order in which the locations were visited. In the table-top search tasks, only 8 of 92 overall recall attempts were less than perfect; and in the natural task, 4 out of 30 recall attempts were in error. Initial analyses also showed that the correlations between a child's age and his or her search

performance in any of the conditions were not statistically different from zero. These data, then, show that neither the ability to remember the order in which locations were visited nor a child's age affected search performance.

The purpose of the main analysis was to determine whether the frequency of searches in the critical area of a table-top task changed as the result of searching initially in a naturalistic or a different table-top task, or as the result of being asked questions about previous search behaviors. The frequency with which each of the 10 locations was examined in searching for the missing object on each of the three searches, and for all of the search problems, is reported in Table 2. The data analyses for the initial and the second search tasks will be considered separately.

Insert Table 2 about here

Logical search performance on the initial search task. The first question of interest was whether children would conduct logical searches in the naturalistic task more frequently than in the table-top task. The critical area locations were, in fact, examined more often in the naturalistic task (M = 1.83 (64%); SD = .75) than in the table-top task (M = 1.36 (44%); SD = .84), t (59) = 2.35, $p < .05$. Also, 76% (23/30) of first searches were in the critical area in the naturalistic task. These data

correspond closely to those of Anooshian et al. (1982) and of Haake et al., (1980) who found that 70% and 72% respectively of first searches were in the critical area in similar naturalistic search tasks. In comparison, significantly fewer (15/31 or 48%) of the first searches in the table-top task were in the critical area, Yates corrected Chi square (1 df, $N = 61$) = 4.06, $p < .05$. These data, then, are consistent with those found by previous researchers in showing that preschooler's logical search behaviors are affected by the nature of the search task.

Logical search performance on the second task. Childrens' ability to restrict their three searches to the critical area in the second task (a table-top task) was examined by a 2 (First Task: Table-Top or Naturalistic) x 2 (Search Related Questions after the First Task: Queried or Not Queried) factorial analysis of variance. Table 3 shows the mean number of searches in the critical area. Children who searched first in a naturalistic task searched in the critical area of the second task more frequently than those who searched first in a table-top task, $F(1,57) = 4.85$, $p < .05$. Further, children who attempted to answer task-related questions after the initial search task examined critical area locations more often in the second task than those who were not asked questions, $F(1,57) = 8.14$, $p < .01$. The interaction between the type of initial task and whether children were asked questions was not statistically reliable, $F < 1$. These data are consistent with the view that attempts to answer context-relevant

questions, and the solution of easy problems prior to attempting a related but more difficult one, increases the likelihood of solving the latter problem.

Insert Table 3 about here

Chance responding. Further analyses were conducted to determine whether the number of searches in the critical area differed from what would be expected by chance. There are several ways of setting the criteria for chance responding. If all 10 search locations are regarded as equiprobable hiding places for the lost object, then it would be expected that 30% of all three searches would be in the critical area by chance alone (3/10 of the 3 searches). However, from an inspection of Table 2, it is evident that children in the naturalistic task did not regard the impossible location (location 4) as a possible hiding place; accordingly it was necessary to select a more stringent criterion for chance responding for this group (3/9 or 33% of the 3 searches).

To compare performance on the first and the second search problems, the two initial search groups were subdivided into two further groups on the basis of the four second search problem groups (i.e., nature of first search task, and whether children were asked questions). Children who searched first in the naturalistic condition examined critical area locations at an

above chance level, *t*'s (14) = 4.52 and 4.00, *p*'s < .01, whereas the critical area searches of children in the table-top condition were not significantly different from chance, *t*(14) = 1.17, and *t*(15) = 1.90. For the second search problem all children, except those who who were not asked questions after the first table-top problem, searched in the critical area at above chance levels (Natural--Questions: *t*(14) = 7.06, *p* < .01; Natural--No Questions: *t*(14) = 3.33, *p* < .01; Table-Top--Questions: *t*(15) = 6.11, *p* < .01; and Table-Top--No Questions: *t*(14) = 1.25, ns). These data indicate that children selected search locations in both the first and the second table-top tasks randomly, unless asked questions about their initial search, or unless they searched initially under naturalistic conditions.

Answering task-related questions. Additional analyses were conducted to examine the relation between the ability to answer the three questions about task 1 search behaviors and task 2 performance. The number of children who answered each of the probe questions adequately for both the natural and the table-top task is reported in Table 4. To be credited with answering a question adequately, children had to articulate the reason for searching or not searching in a specified location. It is possible that the ability to answer the probe questions appropriately would affect the likelihood of searching in the critical area in task 2. Alternatively, it is possible that

merely asking the questions is sufficient to induce access to logical search strategies.

Using linear regression analyses, no relation was found between the number of questions answered about the initial search problems and the likelihood of searching in the critical area in the second problem. These data, then, show that simply asking search-appropriate questions was sufficient to induce children to search in the critical area in the second task. Although there was a trend for children to provide more adequate answers to questions about the naturalistic compared to the table-top task, the difference was not statistically reliable, $t(30) = 1.94$, ns.

Insert Table 4 about here

Discussion

Four-year-olds searched in the critical area of a table-top search task more often if they had previously searched in a naturalistic rather than a different table-top task or, had been asked task-related questions about earlier search activities. Mere exposure to a previous table-top task did not lead to an increase in logical search behavior on a second table-top task, with children searching in non-critical locations as often as in critical area locations. These results provide support for two interrelated conclusions. First, the skills required for logical search do not appear to be "welded" to specific search contexts.

Second, inducing access to logical search skills, either through easy-to-hard problem sequencing or by asking logical search-relevant questions, can lead to the accessed skills being used in contexts where they would not otherwise be used. These results, then, are consistent with previous research, but go beyond them in showing how logical search skills might develop.

Before considering this interpretation, one aspect of the current study needs comment. One goal of previous research has been to show that critical area searching is due to the use of logical search skills rather than the use of spatial-associative search strategies (Anooshian et al., 1982; Haake et al., 1980); that is, due to logical inference behaviors rather than strategies in which search is directed toward locations associated with the missing object (locations 1 and 2 in the present study). It is difficult to dissentangle the two types of strategy-use in this and other studies because children who search the location where the object was last seen (location 2), could be using either logical search or spatial-associative strategies. Nevertheless, it could be argued that the number of searches in locations 1 and 2 in the naturalistic task reflects the use of spatial-associative search strategies (see Table 2). However, this interpretation is unlikely because of the high number of searches in critical area locations (locations 2, 3, and 5). The results of the present and previous research, then, provide converging evidence that preschooler's critical area

searches are guided by logical search strategies and are not an artifact of spatial-associative search strategies.

Under some conditions children searched in the critical area more often than outside of it. This finding could be interpreted in one of two ways. First, it implies that in attempting to locate the missing object children were able to synthesize search-relevant information some of the time. Second, it could also imply that they interpreted their inferences probabilistically rather than absolutely, and saw the critical area as the likely, but not the only place to search. The second position is similar to saying that young children used pragmatic (probabilistic) rather than logical (absolute) inferences in guiding their search.

These two explanations need not be mutually exclusive. It seems likely that a pragmatic search mode may come into operation when the processing demands of the task are too high to allow the integration of information necessary for logical search. This account may explain why more of the first searches were in the critical area than the second or third searches. The information processing load increases after the first search because both task-relevant information has to be remembered, as well as the locations searched and those yet to be searched. In such circumstances, a pragmatic search mode may be adopted by default. This interpretation may also help explain why logical search is enhanced both by searching in a naturalistic task, and by prior

search-appropriate questions; in both instances, the processing load is reduced allowing logical search to operate.

How did the naturalistic task facilitate logical search activity? Several researchers (Brown & Reeve, in press; Gelman, 1978; Reeve, 1985b) have argued that so-called naturalistic tasks provide a supportive scaffold for cognitive activity. According to this view, strategic skills first emerge in the context of day-to-day meaningful activities where the cognitive demands for problem solving have been reduced to a mimimum. It seems likely that the activity of searching in the naturalistic task served a priming function for the later formal task; that is, relevant search strategies had been accessed and mapped onto the subsequent search problem.

Asking search-relevant questions about the initial search task resulted in an increased number of searches in the critical area in the second table-top task. This finding is consistent with other research on the effect of questioning on young children's reasoning abilities (Brown et al., in press; Reeve, 1985a). What cognitive function does question-asking serve? It has been argued that attempts to answer task-appropriate queries lead to the placement of problem solving routines in working memory, making them available for use (Ericcson & Simon, 1980). As young children typically possess poor planning skills, and often fail to access required problem solving information (Brown et al., 1983), answering queries may help them overcome this limitation.

However, further research is necessary if we are to understand fully the role of questioning in facilitating problem solving.

Two issues in particular need to be examined. First, in this and other studies, questions were carefully engineered to focus children explicitly on the task dimensions defined as central to the problem solving enterprise. Understanding the cognitive consequences of questioning demands predicting the effects of different kinds of questions on problem solving. It might be expected that general task-related questions would have less impact on performance than explicit questions. Further, this effect may change with age, with general questions becoming as effective as explicit ones in facilitating performance. Second, in the current study, the ability of children to provide adequate answers to questions seemed less important to effective search behavior than the thought processes invoked by the questions. The facilitating effect of the questions was observed independent of the "difficulty" of the first search task. It seems likely that the level of problem difficulty needs to be within a child's "bandwidth of competence" (Brown & Reeve, in press) for questioning to be of benefit in facilitating performance on a subsequent task. However, the relation between task difficulty, questions, and problem solving performance needs to be thoroughly investigated.

The current research, then, extends our knowledge of young children's logical search ability in showing that these skills

are not necessarily context bound, but that they can be used flexibly and applied to new contexts. It is no longer sufficient for those interested in cognitive development to identify the conditions under which young children first exhibit cognitive skills. Effort needs to be devoted to identifying the circumstances under which children apply their limited repertoire of skills to new problems. The present research suggests that both easy-to-hard problem sequencing and task-appropriate questioning play a role in facilitating the use of cognitive skills. Future research needs to isolate more specifically the function of these two factors in fostering problem solving.

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Table 1

Stories used for the Table-Top Tasks

Story 1 - Bert and his Toy Truck

Event 1. Here is Bert in front of the door to his house. He has a new truck with him. He is going through the house to show everyone his new truck.
Event 2. Bert walked into Ernie's room to show him his new truck.
Event 3. Then he went into Grover's room to show him the truck.
Event 4. And then he went into Barkley's room.
Event 5. Then he knocked at the door of Kermit's bedroom, but he didn't answer and the door was locked.
Event 6. Instead, he went on to Cookie Monster's room.
Event 7. Then Bert went to Big Bird's room. When he got there, he noticed that he did not have his new truck any more.
Event 8. He ran into the last room of the house to find someone to help him find his new truck.
Event 9. Then Bert came out of the end of the house without his truck.

Story 2 - Snoopy and his Suitcase

Event 1. Here is Snoopy in front of his house. He has his suitcase with him. Snoopy is going on vacation, but first he is going to go through the house and say good-bye to his friends.
Event 2. Snoopy carried his suitcase into Charlie Brown's room to say good-bye.
Event 3. Then he went into Sally's room to say he was going, and show her his heavy suitcase.
Event 4. Then he went into Lucy's room.
Event 5. Snoopy then went to Pig-pen's door, but the door had just been painted so he didn't go in.
Event 6. Instead, he went to Linus's room.
Event 7. Then he went into Peppermint Patty's room, but when he got there, he noticed he didn't have his suitcase anymore.
Event 8. He ran through the last room of the house to get someone to help him find his suitcase.
Event 9. Then Snoopy appeared out of the end of the house without his suitcase.

Note. In both stories children saw the referent object carried into, but not out of the house; and Events 2 through 8 correspond to rooms 1 through 7 in the natural task.

Table 2

Frequency Each Location was Examined for the Three Searches

Search Number	Location 1	2	3	4	5	6	7	X
Task 1: Natural Task[a]								
1	3	15	5	0	3	3	0	1
2	9	7	5	0	4	2	3	0
3	3	4	7	0	5	3	3	4
	15	26	17	0	15	8	6	5
Task 1: Table-Top Task[b]								
1	4	6	5	3	4	2	4	3
2	4	5	4	3	3	3	3	6
3	4	2	4	4	8	2	4	3
	12	13	13	10	15	7	11	12
Task 2: Task 1 = Natural and No Questions Before Task 2[c]								
1	2	2	6	2	2	1	0	0
2	0	7	3	1	2	1	0	1
3	3	1	2	2	2	1	2	2
	5	10	11	5	6	3	2	3

Table 2 (cont'd)

Task 2: Task 1 = Natural and Questions Before Task 2[c]

1	1	5	7	1	1	0	0	0
2	1	3	4	2	3	0	0	2
3	1	2	1	0	8	2	0	1
	3	10	12	3	12	2	0	3

Task 2: Task 1 = Table-Top and No Questions Before Task 2[c]

1	3	3	3	1	0	0	2	3
2	2	2	2	3	3	0	0	3
3	1	3	1	2	1	1	1	5
	6	8	6	6	4	1	3	11

Task 2: Task 1 = Table-Top and Questions Before Task 2[d]

1	2	7	5	0	0	0	0	2
2	2	4	2	2	3	0	1	2
3	1	1	4	1	5	1	2	1
	5	12	11	3	8	1	3	5

Note. Locations 2, 3, and 5, constitute the critical search area; locations 6, and 7 were visited after the object was discovered missing; location 1 was visited with the object; and X location(s) were never visited (n=3).

Table 2 (Cont'd)

[a] Number of subjects = 30.

[b] Number of subjects = 31.

[c] Number of children in each group = 15.

[d] Number of children in the group = 16.

Table 3

Mean Number of Searches in the Critical Area in Task 2

Questioned After Task 1	Initial Task: Natural. M	Natural. SD	Table-Top M	Table-Top SD
Yes	2.27	(.70)[a]	1.94	(.68)[b]
No	1.80	(.94)[a]	1.20	(.94)[a]

Note. Maximum number of searches is 3.

[a]Number of children in each group = 15.

[b]Number of children in group = 16.

Table 4

Number of Children Who Answered the Probe Questions Adequately

Task 1

Question	Natural		Table-Top	
Number	Succeed	Fail	Succeed	Fail
1	9	6	4	12
2	11	4	5	11
3	9	6	9	7

Note. Question 1: Why search in the critical area?

Question 2: Why not search in impossible location?

Question 3: Why not search in location not visited?